

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently Amended) A self-piercing rivet for coupling a plurality of workpieces comprising:

a flange with a first diameter and a shank with a hollow cavity extending from the flange, wherein the shank is a straight cylinder with outer diameter smaller than the first diameter, the shank defining a hollow cavity, and a conical section tapered from a shank end and converging towards the flange at angle α and a straight cylinder section with an inner diameter extending from the conical section, wherein the shank has an outer diameter and a substantially flat ring-shaped end surface with ~~an outer diameter and a~~ radial length substantially perpendicular to the shank outer diameter, and wherein the angle α of the conical section ranges between about 70° and about 110°.

2. (Original) The self-piercing rivet in accordance with Claim 1, wherein the thickness of the shank at the straight cylinder section of the hollow cavity is 25 to 45% of the outer diameter of the shank.

3. (Currently Amended) The self-piercing rivet in Claim 2, wherein the flange defines a cylindrical outer wall having an axial length ~~of the flange is~~ 15 to 20% of the outer diameter of the shank.

4. (Original) The self-piercing rivet in accordance with Claim 3, wherein the entire length of the shank is the sum of the overall thickness of the workpieces and a die thickness of the rivet fastening device.

5. (Original) The self-piercing rivet in accordance with Claim 4, wherein the entire length of the hollow cavity in the shank is greater than 70% of the overall thickness of the workpieces.

6. (Currently Amended) The self-piercing rivet in accordance with Claim 1, wherein the radial length of the substantially flat ring-shaped end surface of the shank is between 3 and 10% of the outer diameter of the shank~~0.2 mm and 0.6 mm~~.

7. (Original) The self-piercing rivet in accordance with Claim 1, wherein the entire rivet is heat treated to prevent stress corrosion.

8. (Original) The self-piercing rivet in accordance with Claim 5, wherein the radial length of the end surface of the shank is between 0.2mm and 0.6mm.

9. (Currently Amended) A method of coupling a pair of workpieces comprising:

providing a fastener having a flange with a large diameter and a shank with a hollow cavity extending from the flange, wherein the shank is a straight cylinder with outer diameter defining a hollow cavity, the shank defining a conical section tapered from a shank end and converging towards the flange at angle α and a straight cylinder section with inner diameter extending from the conical section to an end on the flange side, wherein the shank has an outer diameter and a substantially flat ring-shaped end with outer diameter and a radial length defined substantially perpendicular to the shank outer diameter, and wherein the angle α of the conical section ranges between 70° and 110°; and

striking the fastener so as to deform and expand the shank outwardly in a radial direction.

10. (Original) The method according to Claim 9, wherein the fastener is an aluminum alloy.

11. (Original) The method according to Claim 10, wherein the fastener is an aluminum-zinc alloy.

12. (Original) The method according to Claim 10, further including reducing the temperature of the fastener to less than -100°C.

13. (Original) The method according to Claim 10, wherein striking the fastener is striking the fastener so as to form an undercut.

14. (Currently Amended) A self-piercing rivet for coupling a plurality of workpieces comprising:

a flange defining an outer cylindrical wall having an axial length; and

a shank having a body with an outer radius smaller than a radius of the flange, the shank defining a hollow cavity, the shank having a conical tapered section having an angle between 70° and 110° and wherein the axial length of the flange is about 30 – 40% of the outer radius of the shank.

15. (Original) The self-piercing rivet according to Claim 14, wherein the hollow cavity has a diameter of 25 to 45% of the outer radius.

16. (Cancelled)

17. (Original) The self-piercing rivet according to Claim 14, defining a flat end surface adjacent the conical tapered section, wherein the radial length of the end surface of the shank is between about 0.2 and 0.6 mm.

18. (Currently Amended) The self-piercing rivet according to Claim 14 wherein the plurality ~~pair~~ of workpieces have a first thickness and wherein the cavity has a length of ~~the~~ 70% of the first thickness.

19. (Currently Amended) A self-piercing fastener for coupling a plurality of workpieces comprising:

a cylindrical shank body defining a hollow cavity, ~~said~~the cavity defining a conical tapered section having a linear cross-section and defining an angle between about 70° and about 110°, said cavity further defining an upper end defining a concave surface.

20. (Original) The self-piercing fastener of Claim 19, wherein the concave surface defines an interior angle of about 160°.

21. (Currently Amended) The self-piercing fastener of Claim 19, wherein the shank has an outer diameter and a substantially ~~further comprises a flat ring-shaped end surface adjacent the conical tapered section, the flat ring-shaped end surface having a radial length defined substantially perpendicular to the shank outer diameter.~~

22. (Original) The self-piercing fastener of Claim 19 wherein the shank defines a thickness between a shank outer surface and a shank inner surface, the thickness being between about 20% to about 45% of an outer diameter of the shank outer surface.

23. (Original) The self-piercing fastener of Claim 19 wherein the fastener is an iron alloy.